

M I G R A I N E .

Being a Thesis for the Degree of M.D.Edinburgh.

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Beverley,  
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## M I G R A I N E .

### INTRODUCTION.

In writing this Thesis, I have encountered the usual difficulties incident on the choice of a subject. To a man in general practice, in a country town of 13,000 inhabitants, the time and chance for original work come but seldom. It would take months and years, mayhap even decades, for him to encounter, in his daily work, a series of similar cases - in which we might find special features rarely mentioned in the books - from which he might draw original deductions as to etiology - and in which he might try treatment by certain drugs and certain dosage of drugs, without fearing, every moment that, due to some idiosyncrasy on the part of his patient, he were running a risk, and that his professional career might be ruined by his otherwise praiseworthy search after knowledge.

Having been only a few years in general practice, and with, therefore, only a very limited

material to draw upon, I have thought it expedient to write on what is a "classical" subject. My experience therein is, naturally, a comparatively small one, but I have endeavoured, by referring to, and getting assistance from those whose knowledge on the subject is extensive, to compile a Thesis, which, unsatisfactory though it must be (because not original), may yet prove sufficient for the goal I have in view.

For the information contained therein, I have invoked the aid of as many authors on the subject as I could command. I have added, here and there, points on which my small experience is corroborated by these authors, and I have ventured, once or twice, to quote examples of cases which I have had the opportunity of observing in my own practice.

I am only too well aware of how far short of what I would wish this Thesis must fall, but to very few of us is the "laurel wreath" granted, and I shall be indeed well pleased if this poor effort do satisfy the powers that be."

M I G R A I N E .

(Synonyms - Hemicrania Periodica - Clavus  
 Hystericus - Paroxysmal Sick Headache -  
 Bilious Headache. The Mègrims (English) -  
 Hysteria Cephalica - Migrän (German).

DEFINITION. -

Migraine is one of those diseases which occur in paroxysms, and at more or less regular intervals. As there is more or less perfect health in the intervals, it is classed as one of the "paroxysmal neuroses", or "nerve-storms" (Liveing). It is often associated with high intellectual ability, and thus there have been recorded many careful and scientific accounts of it.

ETIOLOGY - (a) - Heredity -

Migraine is strongly hereditary. Liveing found that, in 26 cases out of 53, it was said to be a "family complaint"; and the 26 cases in question had among them 40 near relations who were liable to it.

When one in a family suffers from migraine, other members of the same family often suffer, not from migraine, but from some allied neurosis, e.g.

pure neuralgia or epilepsy (Gowers Vol. II, p.777).

(b) Indiscretion in diet -

This is much doubted, but it has been proved by the fact that some persons can always bring on an attack by eating particular articles of diet towards the end of the interval between one paroxysm, and another; whereas, for a few days after a paroxysm, they might freely partake of the same things without suffering in any way.

No doubt this cause is exaggerated because of the idea that the vomiting which usually ends an attack is supposed to expel something causing it. This often has the appearance of bile and therefore the name of "bilious headache", or "sick headache", which is so popular.- the Doctrine of the Four Cardinal Humors - one of which was "yellow" and the other "black" bile.

OTHER CAUSES. -

(a). Overwork - both mental and physical.

(b). Long exhausting railway journeys - probably the causation here is a double one, viz. the vibration of the train, and the effect produced on the eyes both in seeing things passed by so quickly

perhaps in bright sunshine, and also from efforts at reading in an oscillating carriage.

(c). The catamenia in women. - This usually precedes the flux, but may accompany or even follow it. Each period may be the cause of an attack.

Liveing quotes the case of a woman who had an attack at each menstrual period, but who was quite free from it during repeated pregnancies. He also mentions a case where headache and catamenial discharge were present every fortnight.

(d). Visual Exhaustion. - as in over-study and railway travelling.

Picrery propounded the theory that one variety of migraine was the result of irritation of the optic nerve from straining efforts to see very small objects, or from want of care in regulating the amount of light.

Hypermetrop<sup>h</sup>ia and astigmatism also cause it. Weakness of the internal recti muscles is also a cause. Fogge ( Vol.I, p.789) mentions the case of a bank-clerk who had previously had to give up work several times, for two or three months, on account of cerebral symptoms. It was found, on examination,

that the internal recti muscles failed to make the eyes converge properly on near objects, and, when suitable glasses were supplied, the symptoms soon ceased.

Dr. E. C. Seguin, in his lectures on the "Treatment of Neurosis" (New York Med. Journal, April 12th. 1890), endorses the view that the majority of cases of migraine are the result of eye-strain resulting from the ill-balanced action of the external ocular muscles.

(e). Affections of the Teeth. - This more applies to the form of "clavus".

Mr Salter (Fogge Vol.I, p.789) mentions the case of a young lady, who, for eight years, was subject to headaches confined to the size of a crown piece, rather to the left <sup>side</sup> of the vertex. <sup>a bit more</sup> They sometimes occurred three or four times a week, beginning after breakfast, and lasting all day; they were attended with great prostration. The affected spot became hot, and pressure with the hand gave great relief to the pain. At length the patient conceived the idea that the left upper canine tooth, which was



known to be impacted in the palate, was in some way connected with her sufferings. It was removed, and she never afterwards was attacked by the headache.

(f). Sexual Intercourse. - Sexual excesses are a frequent cause, probably by the nervous exhaustion they produce.

(g). Nervous Temperament. - This is a cause cited by Professor Sir T. Grainger Stewart.

(h). Impure air and unhealthy surroundings - insufficient food. - are all causes due to their influences on the state of health e.g. anaemia being one of the effects.

(i). Attacks of ague - over-lactation - hysteria - also probably from lowering effect on system. These causes are especailly alluded to by Watson (Vol.I, p.718).

(k). Gout. - According to Trousseau, "migraine and gout are sisters". He calls it a symptom of "irregular larvaceous gout". He quotes a case (Vol.IV, p.377) of an English major who had migraine every second Wednesday at almost exactly the same hour. This lasted some hours and left the

patient in perfect health. In 1825, Trousseau saw him, and not knowing what migraine was, and under the advice of some of his professional brethren, he put his patient on a course of strong aloetic pills (pilules Ecossaïses). Under this purging, the attacks lost their periodicity and occurred at longer intervals, but the patients health suffered. Previously, the paroxysms had been succeeded by a condition of well-being, which contrasted in a remarkable manner with the feelings of discomfort which gave notice of their return. Later this patient developed acute gout in the foot, and finally succumbed to an attack of apoplexy.

(l). State of the blood. - Neftel (Sajous Vol.II, c.44, 1890) dwells especially on a change in the quality of the blood.

(m). Uric acid - Haig. This will be treated further under "Diagnosis".

(n). Tetanus of the muscular coat of the vessels on the affected side of the head. -(Du Bois Raymond, "Zur Kenntuiss der Hemikrame. Archiv. für Anat. und Phys. 1860, p.461-468," or in other words, tetanus in the region supplied by the cervical part

of the (right) sympathetic nerve. He found that during the attack in his own case the temporal artery of the painful side was hard and cord-like to the touch, while that on the left side was in its normal state. The face was pale and sunken; the right eye small and injected. The pain was increased by everything which raised the blood pressure in the head (as stooping, coughing etc.), this increase being synchronous with the pulse in the temporal artery. Towards the end of the attack the right ear became warm and red.

These phenomena,- the state of the temporal artery, the bloodlessness of the face, the sunken appearance of the right eye, show that the muscular coat of the vessels on the affected side of the head was persistently contracted. On removal of the cause which produces this condition of tonic spasm, relaxation follows the overaction of the unstriated muscular fibres, and the walls of the vessels yield more than usually to the lateral pressure. This secondary relaxation explains the congestion of the conjunctiva, and the redness and increased temperature of the ear, which occur when the violence of the

attack begins to subside. The vomiting and flashes of light before the eyes which frequently accompany hemicrania are caused by sudden changes in the intracerebral blood-pressure; and these variations obviously correspond to the irregular contraction and relaxation of the unstriated muscular coat of the vessels.

Sex.

Females usually suffer more than males.

Eulenberg says that five women have hemicrania to one man.

Age.

It usually begins about the 7th. or 8th. year, at the beginning of the second dentition- also at puberty. According to Gowers (Vol.II, p.777) one third of the cases begin in later childhood, between five and ten; about two fifths between ten and twenty, and most of the others between twenty and thirty. The maximum periods are late childhood, puberty, and early adult life.

S Y M P T O M S.

The essential symptom is paroxysmal headache, but many patients present other sensory symptoms along with the headache, and in rare cases these symptoms may appear without headache.

Let us briefly describe the symptoms of an ordinary attack and then discuss these symptoms in detail.

A day or two previous to one of the paroxysms, the patient will not feel well. There is general depression and morning headache for a day or two before. Burney Yeo (Vol. II p.376) cites a case which was always ushered in by the presence of abundant phosphates in the urine. Then come the disturbances of vision and other sensory symptoms, next there is the boring, almost unbearable headache along with nausea which usually culminates in sickness, when the attack as a rule is at an end.

Taking these symptoms in detail, I shall first of all describe the headache.

Headache.-

This occurs in the majority of cases. It is usually of great intensity, beginning at one spot

and slowly spreading. Sometimes it is confined to a single point, usually the frontal or parietal bone. To these last the special name of "clavus" was applied.

The term "Hemicrania" would imply that the pain was confined to one side of the head only, but Liveing denies this. He finds that in the majority of cases it affects the whole forehead and both temples, though usually worse on one side than the other. The pain causes profuse sweating, and, in one case I have seen - a medical man - this was entirely confined to one side of the head - the side on which the pain was worse. There is seldom any local tenderness during the paroxysm, but this may appear over the whole hairy scalp after the attack is over and remain for a few days.

The pain is boring; some patients describe it as the point of a gimlet slowly boring into the brain - the gimlet enlaving as it bores its way in.

The headache goes on increasing till it reaches a culminating point, when it begins to decline. Its increase is usually steady, but sometimes it takes place by fits and starts with more or less complete

remissions (Fogge Vol. p.782)

Sensory Symptoms.

In most of the cases the attack is ushered in by disturbances of vision. These are very varied. There may be an appearance of a bright spot on one side of the field of vision (usually opposite side to that on which pain is the more severe (Quain's Dictionary p.30) ), which spot gradually enlarges and changes in shape. This spot may be exactly in the middle of the field of vision, but more generally it is to one side and the patient, who may be reading at the time, has to look sideways to make out the words. This spot enlarges till it blots out half of each field. As it spreads it assumes curious outlines; it may be zigzagged with angles like these of a fortification (Airy's Teichopsia), or it may be undulating and the edges may appear to revolve. There may be scintillating flashes of light - a regular "firework display," and many other curious visual phenomena. In one of my own patients everything appeared to be inverted, and in another the first indication of an attack was hemianopia. I was present on one of these occasions, and was rather surpris-

ed at the patient bursting into laughter. He explained that he could only see half of me and that this this was always his first symptom in an attack.

Both eyes are always affected, though Sir John Herschel stated that only his left eye suffered.

Other sensory symptoms are felt in the limbs, throat and tongue, but these are less frequent than the visual disturbance. In the limbs, the sensations are felt much more frequently in the leg than in the arm. These sensations are usually associated with the visual disturbance, though they may occur alone at the first stage of an attack.

The sensations assume the form of tingling and "pins and needles" in the fingers and wrists and as they spread, they are succeeded by numbness of the parts affected. There is sometimes loss of sensibility amounting almost to anaesthesia of these parts.

This numbness may occur first to be succeeded by the tingling. It may pass from one arm to the other, though it is usually confined to one side.

There may also be transient loss of power



in the hand and arm muscles, but Liveing says this is rather loss of the sensations, which should guide the muscles than true muscular paralysis. A sensation in the lips, tongue and adjoining parts is generally secondary in time to that of the limbs and rarely exists alone.

When sensory symptoms do occur, they are almost always confined to the right arm.

Transient aphasia may also occur (Gowers Vol.II , p.781), and Liveing cites a case in which not a single word could be uttered.

The common character of the defect is a difficulty in finding the right word, or a wrong use of words, both in speaking and writing.

Slight mental changes may occur e.g. emotional disturbance; confusion of ideas, transient loss of memory. Brief stupor may be present and Gowers mentions a case of "double consciousness".

Giddiness approaching to actual vertigo may be present.

#### Cerebral Symptoms.

Berbez reports a very interesting series of

10 cases, (including that of himself and his brother), of migraine accompanied with cerebral symptoms of a varying nature (the "migraine accompagnée" of Charcot). The "migraine accompagnée" is certainly a symptom of great importance. It is a concurrence of signs indicating that a portion of the brain functionates badly, due probably in most cases to an arterial spasm. But it is not improbable that, in consequence of the repeated local spasm, local lesions such as a pachymeningitis for example, may exist. The cerebral symptoms vary greatly in the different cases and in different attacks of the same case, and are of such intensity and severity that it is at first difficult to realize that they are of a temporary nature and not dependent upon organic disease of the brain. This form of migraine is usually hereditary and, very frequently, the attacks are directly caused by ocular fatigue. The attacks in most cases are not frequent, occurring once every two or three months, and their duration is short.

The great variety of the cerebral symptoms complicating the migraine is shown by a short abstr-

act of the 10 cases.-

Case I - Attacks of migraine, not very painful, but accompanied sometimes by concentric retraction of the field of vision, sometimes by aphasia, sometimes by hemianopsia superior, and sometimes by a numbness of an arm.

Case II - Migraine not very severe, but accompanied sometimes by vertigo, sometimes by aphasia and agraphia, and sometimes by concentric retraction of the field of vision.

Case III - Migraine severe and accompanied by scintillating scotoma and right-sided numbness and hemiparesis.

Case IV - Migraine accompanied by left-sided hemianopsia, hemianaesthesia, hemiparesis, and a slight aphasia.

Case V - Migraine without headache, but with amblyopia and numbness of right side.

Case VI - Migraine accompanied by left-sided hemiparesis and hemianaesthesia and scintillating scotoma.

Case VII - Migraine accompanied by difficulty of speech, numbness of right half of body, and

amaurosis of the right eye.

Case VIII - Migraine accompanied by aphasia, agraphia, numbness and weakness of right arm.

Case IX - Migraine accompanied by aphasia, hemianopsia and epileptiform convulsions.

Case X - Migraine accompanied by aphasia and numbness of the right arm.

In cases VIII and IX there was probably a localized cortical lesion of syphilitic origin, the symptoms of which disappeared under syphilitic treatment.

(Sajous Vol. II, 1890, C.45).

Vaso-motor Symptoms.-

The most common is pallor of the face at the onset of an attack, and often throughout its whole course. The extremities are usually cold. The temporal artery becomes enlarged and its tortuositis are plainly visible on the affected side of the head, and hard to the touch.

In a woman aged 50, subject to attacks of migraine from youth, the right temporal artery was harder and more rigid than the left, and the right cornea presented an arcus senilis twice as broad as

that on the other side (De Giovanni).

As the pain develops, the face usually becomes flushed and there is profuse perspiration.

Sometimes there is a conspicuous difference in the aspect of the two sides of the face. There may be pallor on one side, and in addition, the eye may be retracted, the conjunctiva injected, and the pupil contracted; as the paroxysm goes off, the condition may be exchanged for one of hyperaemia - the face becoming warm, the ear red, and the pupil resuming its natural size (Du Bois Raymond, Morselli). The former must be referred to diminished action and the latter to increased action of the sympathetic fibres, although in over-action, the retraction of the eye and redness of the conjunctiva are exceptional (Gowers). Puffiness of the scalp has been observed at the end of an attack, and, in rare cases, ecchymoses at the seat of most intense pain.

#### State of the Pupil.-

Du Bois Raymond says it is always dilated; on the other hand, Picorri and Latham describe it as always contracted. In all the cases I have seen

the latter has been the condition. In one instance Molendorff found with the ophthalmoscope the background of the eye was of a bright scarlet color, the optic papillae red and cedematous, and the central artery of the veins enlarged. These facts have a theoretical interest as indications that the sympathetic nerves play an important part in the production of migraine (Fogge Vol.I, p.783).

I have examined several times with the ophthalmoscope, and am inclined to think that I saw considerable enlargement of the vessels. I do not lay any stress on this point, as I suffer from considerable astigmatism and hypermetropia, and this mode of examination is, therefore, one of considerable and increasing difficulty to me.

Ptcosis and strabismus have also been observed during the paroxysms.

As noted by Liveing and others the pulse is slow and of high tension.

(High tension pulse of a uric-acid headache-Haig)..



Gowers has noted a pulse rate of 56, and

other observers have recorded 52.48, and even so low as 40 during the paroxysms.

#### Temperature.

Liveing notes that during the attacks the temperature even in the axilla is subnormal, but other observers have not noticed much variation. This applies to adults only, for in children there may be considerable pyrexia, and this complicates the the diagnosis.

Gowers (Vol.II, p.785) quotes a case of a child of two, who became liable to attacks which lasted only a few hours, and recurred at intervals of two to three months. In each there was severe one-sided pain in the head; the temperature rose to 102" or 103"F; sickness came on, the child went off to sleep and woke up quite well.

#### Saliva.-

Berger ("Zur Pathogenese der Hemicranie", Virchow's Archiv.LIX, Heft.3 & 4, 1874) found that two pounds of tough saliva had been discharged during an attack. This he quotes as due to irritation of the secretory fibres for the salivary glands which are found in the cervical sympathetic.

Sickness.-

Nausea usually accompanies the headache but does not usually begin till the pain has reached its height. There is as a rule complete inability to take food and the bowels are irregular - either constipation or diarrhoea prevailing.

This nausea usually ends in vomiting, but retching is more frequent. If the stomach is empty, mucus and then a bilious looking fluid are brought up. If the stomach is full, the food is generally only partly digested, as there seems to be accompanying derangement of the gastric functions.

This vomiting generally relieves the pain, but, if it occur while the headache is at its severest point, it does not relieve it (Gowers Vol. II p.783). When there is no headache, there is as a rule no vomiting.

In some cases, however severe the pain is, vomiting seldom or never occurs. In them the pain gradually passes off of its own accord. Very often it lasts for the remainder of the day and the patient, wearied out, falls asleep, and, on awakening the following morning, all the suffering is over and only



a slight soreness of the temples is left to tell the tale. Some patients lose the pain if they can sleep for a short time, even though it be at the very outset.

Liveing quotes a case of a gardener who, if he could leave his work and lie down in the shadow of the trees for half an hour, would waken cured.

Urine.-

The urine during the attack is scanty and of high color and specific gravity; thus in the attack it may not exceed 40-50 cc. in the hour; after the attack and especially just as it passes off, it may run up to 100 or 150 cc. - or more - in the same period.

Burney Yeo (Vol.II, p.376) states that in one of his own patients the attack was always ushered in by the passage of urine loaded with phosphates, and, as the attack passed off, the phosphates disappeared, and the urine threw down lithates abundantly. The disappearance of the phosphates and the appearance of the lithates in the urine is always a sign that the attack is passing off.

Varieties of Migraine.-

These have been already partly alluded to under "cerebral symptoms".

I would like, however, to give the opinion of other authorities on the point. For example, Claus (La Flandre Méd. Nos.7, 10, 16, 1894) divides this disease into simple, ophthalmic and ophthalmoplegic varieties. The former includes hemicrania, associated with nausea, vomiting and other disturbances, which go to make up the familiar picture of "sick" or "bilious" headache.

The ophthalmic form is accompanied by scintillating scotomata. This form may follow the first variety, or alternate with it, and may be accompanied by hemianopsia, and sensory and motor disturbances.

The ophthalmoplegic form differs from the others in that the hemicranial pain is more intense and terminates in a paralysis of the third nerve to a marked degree. This paralysis is on the same side as the pain, and lasts for days, and even weeks. The author does not agree with Fèrès' view that

migraine is a species of epilepsy, but supports the auto-intoxication opinion for its causation, and lays stress upon the frequent association of chlorosis in these cases. Gowers (Vol.II, p.785) again supplies certain varieties.

He says "the cases in which the collateral disturbance is absent, and the attacks consist only of pain and sickness, are very common. The pain has the same characters as in the cases with other sensory symptoms and may be attended by the same vaso-motor disturbance. In one patient, for instance, the pain began in one eye and the super-orbital region, and commenced alternately on each side; from the place of commencement it extended over the whole head, and into the throat. It is very common for two kinds of headache to occur, and for only one to be accompanied by other sensory symptoms. Sometimes one is attended with vomiting and the other is not. One patient, for instance, sometimes had attacks of pain in the forehead and temples, and at other times pain at the top and back of the head, and only the latter were attended by sickness.

The sensory symptoms of migraine sometimes

occur without headache, or more frequently, with headache that is so slight as to cause the patient no distress, and to lead him to place no weight upon it in his description of his symptoms. These cases are of great importance because their nature is often misunderstood. In one case with characteristic visual disturbance, (an expanding luminous spot and hemianopsia), the only discomfort was that a cough or deep inspiration caused momentary pain over the eyebrows during two or three days after an attack.

A more common history is that some attacks are complete, consisting of sensory disturbance, and headache, while in other cases the former occurs alone. In rare cases the sensory disturbance or aphasia, generally occurs by itself, headache being seldom or never associated. Lastly some sufferers from migraine often have slighter and variable sensory disturbance, evidently of the same nature, although not of the same form, as that which precedes the headache. One patient for instance, with characteristic headaches, preceded by hemianopsia, complained of bright stars before the eyes whenever she looked at a brilliant light, and sometimes one of these stars, brighter than the rest, would start from

the right lower border of the field of vision and pass across the field, generally quickly, in a second, sometimes more slowly, and when it reached the left side would break up and leave a blue light in which luminous points were visible. These sensations were not succeeded by headache, although the pain always followed the hemianopia. Aphasia does not often occur without headache; such attacks may be very puzzling unless their nature is suspected.

Sensory disturbance in the limbs does not often occur without headache, but occasionally the headache is slight. Sometimes an attack is apparently rendered abortive in consequence of some drug that is taken, such as bromide, as in the following case which deserves description on account of the deliberate march it affords of the sensory disturbance.

A gentleman, the subject of migraine, was working with the microscope one afternoon, when his sight became dim so that he could only just read large print, and continued so in spite of  $3\frac{1}{2}$  of bromide. After two hours, tingling suddenly occurred in the left thumb, and spread to the fingers and

then was felt in the middle of both lips, in the tip of the nose, and beneath the tip of the tongue. Then it was felt in the left arm near the axilla, and in the left side of the fauces and of the face over the lower jaw; a few minutes later it involved the fauces on both sides and the palate, and caused an unpleasant sense of constriction. It then ceased, and headache came on. Another attack began in the same manner, but after being felt in the fingers and lips and tongue, it became intense at the wrist and ceased in the lips; the sensation passed up the ulnar side of the forearm and then ceased, but afterwards recurred in the cheek and side of the throat."

#### Terminations.-

The attack may end in the usual way - the patient either vomiting or falling asleep, and being better in each instance. In other cases the final act may be epistaxis; or copious weeping; or by profuse perspiration; or by the passage of a large quantity of pale urine.

#### Duration and Course of Attacks.-

The duration of the headache is always

several hours; often it begins in the early morning and lasts the entire day; in severe cases it may last for several days.

The interval between the attacks varies, but is usually between a fortnight and two months. The intervals are on an average shorter in the cases in which there is only pain, than in those in which there are associated sensory symptoms.

It is not uncommon for some change in the character of the disease to occur at a certain period.

Sensory symptoms may cease, or, if previously absent may come on.

Occasionally some morbid influence, chronic ill-health, acute disease, anxiety, or injury, may induce an increase in the intensity of the affection or change in its character.

#### Complications and Associations.-

Vertigo is occasionally met with, not only as a part of the attack, but as a symptom at other times. It is probable that this vertigo is allied to Menière's disease, as it usually occurs in people over middle age.

There is also the well-marked relation to gout. Trousseau, (Vol. IV, p. 378, Sydenham Society), says "so evidently in many cases is it a manifestation of the gouty diathesis, that articular gout and megrim are observed in the same person, the one subsiding on the appearance of the other; and it is often, also, the only manifestation of the hereditary tendency in subjects who are the children of gouty parents.

An alternation is sometimes noticed with other forms of neurosal disorder, or at least a transition from one to the other. Thus, migraine occasionally ceases, and is replaced by simple neurologic. +  
 Liveing gives many other cases of this transition e.g. to gastralgia, laryngeal spasm, anginal seizures, and paroxysmal insanity. In one case acute mania came on.

Savage (Journal of Mental Science, Jan. 1887) says "I have frequently met with cases of severe migraine in the neurotic subjects, and I have found, as a rule, that patients who suffer from this disorder, if they become insane, lose their headaches; and I have seen one man who appeared to improve but



relapsed, when he had not developed migraine; but when he began again to improve and had a recurrence of headaches, his sanity was assured.

In one case only I have seen the more severe nerve-storm of insanity leave the nervous sky clear, the patient for some years, during which I had the chance of seeing him, remaining free from both headache and insanity. This is interesting from the fact that I know of one case at least in which epilepsy seemed to clear the mental atmosphere also".

The most important and the most frequent of these associations is the relation of migraine to epilepsy. The connection of the diseases is of special interest because the sensory disturbance of the two has so many common features. Gowers mentions 12 cases in which these two maladies occurred in the same individual. In seven instances migraine had existed for many years and the patient afterwards became epileptic. In five of these the migraine either ceased or became much slighter when the epilepsy developed; in one the opposite relation was observed, an epileptic patient began to suffer

from migraine when the fits ceased. In almost all of the individuals who had suffered from the two diseases, the attacks of migraine were attended by well-marked sensory disturbance in addition to the headache and vomiting, and in one or two abortive attacks of sensory disturbance occurred. In several cases, also, the epileptic attacks began by a local aura in the limbs, a rare feature in idiopathic epilepsy. In some cases in which epilepsy succeeded migraine, the epileptic fits seemed, as it were, to grow out of the attacks of migraine, being preceded by such sensory symptoms as had occurred before the attacks of headache.

Liveing again quotes a case in which migraine became replaced, after a certain period, <sup>by</sup> ~~at~~ asthma; and another, in which a constantly recurring gastralgia disappeared and was followed by a typical migraine, while this, in its turn, was succeeded by a kind of spasmodic croup. He also related a case in which migraine was followed after a time by angina pectoris; and another in which insanity developed.

Liveing also quotes Calmeil as having

remarked that both the intellectual faculties and the moral disposition of the patient are sometimes impaired by the repeated occurrence of migraine. He also refers to the cases of Parry and Wollaston, both of whom, after having been long subject to this complaint, died of organic cerebral disease.

When a migraine which has been habitual for many years - once in a month or more often - suddenly becomes more frequent and severe, it may indicate the onset of nephritis.- the urine must be carefully tested.

If there is no sign of this, examine the heart or, failing this, inquire for recent severe illness or look for signs of new growth.

After the subsidence of the paroxysms, certain curious alterations in the tissues of the affected parts are sometimes observed. This can only be referred to an interference with their nutrition consequent on the nervous disturbance. One such change is a localized greyness of the hair. Austie found that 11 out of 27 patients found more or less greyness of the hair of the forehead and temple of the side on which they suffered the more intense

pain. I recollect the case of one of my patients whose left eyebrow and lashes used to turn quite grey and remain so for several days after an attack.

Austie also mentions more or less thickening of the solid tissues as the result of repeated attacks. He also speaks of iritis, glaucoma, opacity and ulceration of cornea as resulting from neuralgia of the fifth nerve; but it is not certain if these occur in true recurrent migraine.

Mr Hutchinson mentions xanthelasma as a sequel. It usually develops in middle age, and begins on the left side earlier than on the right.

PATHOLOGY.

No anatomical changes are known to underlie the phenomena of migraine, and from the character of the symptoms, and the analogies of the disease, it is unlikely that any will be discovered. Hence the nature of the malady is a matter of inference, and hypotheses are sufficiently abundant and precise. (Gowers, Vol.II., p.788).

The first theory I shall draw attention to is the one mentioned on page 8, , that of Du Bois Raymond viz., Tetanus of the muscular coat of the vessels on the affected side of the head.

The suggestion that spasm of the cerebral arteries was the cause of the symptoms was first made by Whytt, and the evidence in favor of this opinion, as pointed out by the accessible vessels, was pointed out by Du Bois Raymond. Mollendorff held that vascular dilatation, rather than spasm, caused the symptoms, and the fact that the condition varies in different cases, has led to the theory, held extensively in Germany by Eulenberg and other writers, that there are two varieties of the disease - the

"Sympathetic tonic" and the "Sympathetic paralytic" forms, as they are sometimes called.

Dr. Latham of Cambridge, who arrived independently at the same conclusion that the attacks dependent on vaso-motor derangement, has suggested that the early symptoms of the paroxysm are due to spasm and the <sup>headache to</sup> dilatation of the vessels. According to these theories, the malady is essentially one of the sympathetic nerves. The other and alternate explanation of the disease is that so ably put forward by Liveing. He holds that it is due to primary derangement of the nerve cells of the brain. Their function is from time to time is disturbed in a peculiar manner, and the visible vaso-motor disturbance is of a secondary origin. The periodical derangement of function has been called, by a somewhat inapt metaphor, a "nerve-storm". Liveing says that the phenomena are those of a nerve-storm traversing more or less of the sensory tract from the optic thalami to the ganglia of the vagus, or else radiating in the same tract from a focus in the neighbourhood of the quadrigeminal bodies. W

Migraine is undoubtedly one of the paroxysm-

al neuroses and, as Liveing remarks, there is a clear analogy between the paroxysmal neuroses, and certain other consensual and automatic movements, such as sneezing, coughing, gasping, to which may be added ejaculatio seminis - a short convulsion - as it has been termed, and in certain cases accompanied by a true epileptic attack (as in the case of Napoleon). Liveing says that none of these can be caused by vaso-motor disorder, and his explanation is that it is a "nerve-storm", the result of an irregular accumulation and explosive discharge of nervous irritability. I hope to show later on how this theory will work in with what seems to me must be the only explanation.

Among other theories is that of Schnetter, who supports the view (Sajous 1890 Vol.II., f.44) that nervous headache is a neurosis due to an irritation which originates from some pathological condition in the nasal cavity, is reflected to the cervical sympathetic ganglia, and, in consequence, causes circulatory disturbances in the head. The first and second branches of the trigeminal nerve are most fre-

quently the seat of the pain because of their intimate connection with the cavernous sinus.

Jones (Sajous Vol.II., 1890 2.44) publishes an article in which he divides nervous headache into two classes, one with diminished, and the other with increased, blood-pressure.

Ramsay (ibid) tabulates 50 cases treated exclusively by correction of the eye strain.

Overend and Nothnagel publish accounts of this malady, but I have been unable to secure their works.

I now come to what, after much consideration and reading, I cannot but consider as the true pathology of the disease. I refer to Haig's Theory of Uric Acid. As I shall mention later under Treatment, I have unconsciously, but to a very limited extent, in some of my own cases, got a mere glimpse of his meaning of Pathology and Treatment in this disease. I have never read his book till very lately and human nature is only too fallible and apt to be easily convinced; but, till more conclusive evidence to the contrary is adduced, I cannot but believe that he has formulated what is, up to the present time, the most



practical and convincing monologue on the subject of this disease on record. Being himself a sufferer from this disease, he has made most careful and exhaustive experiments, and has, as I shall show later under Treatment, completely cured himself of it.

His first mention of the subject was in the Practitioner, 1884; in this he attributes the malady to the formation of some poison, possibly in the nature of a ptomaine, in the intestines during the digestion of butcher meat. A further study of the clinical history brought out such a strong relationship to gout, that he began to suspect Uric Acid as the poison (Practitioner 1886). He thereupon began to estimate the excretion of uric acid and urea. At first he estimated the excretion of twenty-four hours, and, as many of his headaches lasted only a portion of a day, he got unsatisfactory and contradictory results; but when he separated the urine excreted during the headache from that before and after it, a definite and distinct relation between the headache and the excretion of uric acid became at once apparent. Having observed the relation of the headache to the excre-

tion of uric acid, he soon noticed that other symptoms of the disease bore exactly the same relation to uric acid: that, when the pulse was slow and of high tension, there was always a greater excretion of uric acid than when it presented the opposite character, and the same with the mental depression and scanty urine.

Further experiments elicited the fact that the excretion of uric acid was absolutely within his own control, and that he could alter it from day to day, or hour to hour in whichever direction he pleased (Journal of Physiology Vol. VIII). He discovered that in altering the uric acid he could alter the symptoms related to it, that, when he produced an increased excretion with alkali, he produced the headache, mental depression, cold surface, slow pulse and scanty urine, and, that when he stopped this plus excretion with an acid, he removed all these symptoms; so that, not only could he produce or remove the headache, but he could also so contract or relax the arterioles and capillaries as to effect the tension of the pulse, the rate of the heart's action, and thus influence the circulation in the brain, skin, kidneys and probably

even in the whole body. He also observed that, in curing a headache by giving an acid to lessen the excretion of uric acid, he always experienced a certain amount of pricking in the joints most used during that day, and his natural inference was that it was the uric acid held back in these joints that produced the pain. This idea was confirmed by reference to Sir A. Garrod's work on Gout, where similar pains are described as occurring in the joints of gouty people after the ingestion of acid beer and wines.

He states that the blood never becomes loaded with uric acid except as the result of previous imperfect excretion, and that such imperfect excretion is quite sufficient to account for the presence of a very large amount of uric acid, without their being need for the excessive formation theory as an explanation.

His researches extend over nearly six years. Taking 616 days of this time he found, in his own case, that 6.363 grains of uric acid, 194.617 grs. of urea, and 29.193 grs. of acid (reckoned as oxalic acid) were excreted. This gave a relation of uric acid to

urea of about 1-30.5, and a relation of acid to urea of 1-6.6

Yvon and Berluiz (Revue de Méd. Sept 1888) found this relation 1-30, and again 1-40.

Lecanu (Sir Dyce Duckworth "Treatise on Gout" p. 120) found the relation 1-33. Haig adopts the same view as Sir A. Garrod as to the ultimate stage of the formation of uric acid, viz., that urate of ammonium is produced in the kidney.

He found at first that while he might have a very bad headache one day with an excretion of 16 grains of uric acid in the twenty-four hours, there might be an exactly similar excretion the next day and no headache whatever. These observations would appear contradictory, but were explained by the fact that, on the day with the headache, the relation of uric acid to urea was 1-33, and in the day without the headache the proportion was 1-18 or 1-20.

He finds climatic alterations <sup>a</sup>ffect the excretion of uric acid and urea. Thus in 202 days of winter, the proportion was 1-33, in 40 days of spring 1-30, and in 150 days of summer 1-29. This fact, that the excretion of uric acid is greater in

the spring and summer months, has an important bearing on the seasonal variations of this and certain other troubles due to uric acid.

As the result of experiments, he concludes that all the fluctuations which occur in nature, or can be produced by drugs, are fluctuations of excretion only. He does not assert that excessive formation does not occur, but holds that it is proverbially difficult to prove a negative.

He summarizes his results in the general statement that all substances which increase the solubility of uric acid increase its excretion, and clear it out of the body, while, conversely, all substances which diminish its solubility diminish its excretion, and tend to produce its retention in the body and accumulation in various organs and tissues.

DIAGNOSIS.

In its typical form migraine presents little or no difficulty of diagnosis. From other kinds of headache it is distinguished by its sensory accompaniments, and, if these are absent, by its paroxysmal character, severity and definite course.

In malarial headaches the intermissions are shorter and the cause is usually traceable. The pain of chronic brain disease is more or less constant; it may have its remissions and even intermissions, but it has not the longer intervals of migraine.

The first attack may be puzzling owing to the sensory disturbances in the limbs and the affection of speech, but the symptoms are so brief and so usually associated with visual disturbance, that a diagnosis of acute brain disease may be put out of court.

When the speech is specially affected and there is severe headache, the question of embolus may arise, but time alone will verify this.

Fogge relates a case in which syphilitic periostitis of the margin of the orbit has produced re-

current headache, but the diagnosis here ought to be fairly easy.

A greater difficulty is that presented by the diagnosis from the "petit mal" of epilepsy. As we have seen, the disease may be transitional or even co-existent. In most cases of epilepsy with a visual aura, this is brief, while in migraine it usually lasts 20-30 minutes. The presence of a convulsion would of course decide the question.

The greatest difficulty is seen in those cases where migraine is complicated by a concurrent disease, e.g. Bright's disease with optic neuritis, retinal changes and intense headache. Here the two sets of symptoms would complicate each other.

In another case the complication took the form of general paralysis of the insane, and the sensory disturbance that had preceded the attacks of headache occurred alone, and complicated the paroxysmal symptoms of the cerebral disease.

PROGNOSIS.

The prospect of recovery - that is complete recovery from the attacks - is never considerable. It is best in those rare cases in which the malady is of short duration, and where there is some removable cause in the general health or mode of life. The longer the disease has lasted, the less is the prospect of a cure.

Hereditary tendency has also an unfavourable influence on the prognosis. Gowers says that in the second half of life the tendency to cessation is greater than in the first half. By this, I presume, he refers especially to cases of women in whom the menstrual flow ceases early. Much may be done by judicious and persevering treatment to ameliorate, if not to cure, this distressing malady. On the other hand, if Haig's view is the correct one, one cannot but believe that the prognosis of this disease will, in future, be much more favourable, and that many, who all their lives have been martyrs to it, will be cured, and in the Lethe of painless present, drown the sufferings of the all too painful past.



TREATMENT.

In discussing this part of my subject, I intend to touch upon as many points as I can in therapeutics, but I wish especially to draw attention to the very great value of sound dietetic treatment. The question of treatment divides itself into two distinct parts.

(1). The means to be adopted in the intervals between the attacks, with a view to prevent their occurrence, or diminish their frequency.

(2). The treatment of the attacks themselves.

(1). The Treatment between the Attacks.

It is to this that the greater consideration must be given, for, if success be gained here, there will practically be no need for anything further.

First of all a cause must be looked for, and, if discovered, it must be removed and the bodily and nervous systems braced up. The importance of daily exercise, short of fatigue, must be insisted upon: there must be no excess of brain work and no

mental worry or domestic anxiety. This last sounds very well, but, as many patients regard their medical adviser in the light of an automatic machine - a sort of pull the bell and the figure works puppet - how is it possible for us always to penetrate below the surface, and, even if we do, in how many cases are we utterly powerless? However, the advice "no mental worry nor domestic anxiety" is good if it can be adhered to. The state of the digestive organs should be strictly enquired into, and any article of diet which the patient's experience may show him to be the exciting cause of an attack must be carefully excluded. In the case of children, it should be especially enjoined upon the parents, if of a gouty or neurotic tendency, or if these children show signs of migraine or allied neurosis, how unwise it is to press the matter of education. They should be instructed to send their children to school at a later period than is at present considered en règle, and they should see that the child is not overworked there, and especially that the home lessons, as is too often the case, do not take up that time which would be more profitably

spent in open-air recreation. This particularly applies to girls about the age of puberty. Here I would advise the sweeping measure of taking the girl away from her studies altogether. The appearance of the catamenia is just the time when the girl, who is to be the mother of a future generation, needs the most extreme care and attention in the matter of her health. She should be ordered to take plenty of fresh air and exercise, and all undue excitement, such as late hours and exciting, and, in too many cases erotic, (if I may use the term), literature should be avoided.

The patient's bedroom should be large and well-aired, and not, as is too often the case, one of the <sup>smallest</sup> ~~least~~ rooms in the house.

The drugs employed in the treatment of this disease are legion.

Liveing states that he has found the regular administration of belladonna and hyos<sup>y</sup>camus of great service. Cannabis Indica is also of service.

Dr. E. C. Seguin (New York Med. Journ. April 12. 1890), going on the view, before represented, that

the majority of cases of migraine are due to eye-strain from the ill-balanced action of the external ocular muscles recommends the mydriatics, Belladonna, Atropine, Cannabis Indica, Hyoscyamine. These exert a sedative and even a paralysing effect on the third cerebral nerve and its attached muscle. They must, however, be combined with correction of the ocular defect by appropriate glasses, and, in some cases, tenotomy, and if a reduction in the use of the eyes can be secured a cure results.

The state of the bowels must be attended to, and this is best done by a pill of aloes and henbane, containing also Gr.i of blue pill at bed-time, with a dose of mineral water, e.g. Hunjadi János, Karlsbad, Apenta, in the morning on waking. For anaemic and neurotic patients, iron tonics will be required. It may be given in the form of the ammonio-citrate alone, or combined with 2 or 3 grains of iodide of potassium. Strychnine may also be added in the form of the liq.strychninae hyd. or tinct.nux vomic., and calumb. or quassia in infusion added. A course of iron water at St.Moritz, Schwalbach, Pyrmont, Spa,

often proves of great use in these cases.

In hysterical patients, strychnine is not so good, and bromide of potassium in 10 gr. doses with M.20 of tincture of hyoscyamus and a vegetable bitter, thrice a day, will be found of more effect. As a rule, however, bromide is of more use during the paroxysm.

In nervous subjects, cod-liver oil alone, or along with malt & hypophosphites, is of great use from its tonic effects.

Arsenic has been used with success, especially by Dr. Bright and Sir Thomas Watson.

Watson (Lectures on Physic Vol.I., p.718)

"I believe that 4 or 6 drops of the liquor arsenicalis given three or four times a day, with due attention to the state of the bowels, will be almost sure to remove hemicrania in nine cases out of ten in which it occurs. But steel or bark, being milder and safer drugs, are, caeteris paribus, to be preferred." He also employed the shower bath in anaemic cases.

Quinine has also been largely used, and Watson says it will yield to this drug when the attacks are strictly periodical.

Bamberger gave quinine during the intervals and a full dose at the beginning of an attack.

Burney Yeo believes in a careful use of the bromides, especially in those cases in which the sensory disturbances are chiefly complained of, and the subsequent headache is but slight. When the period of an attack is well known, he gives the mixed bromides in moderate doses, for three or four days before the attack is expected. Bromide of lithium and bromide of nickel are preferred by some. He also finds that a combination of butyl-chloral hydrate (grs.V-VII) & potassium bromide (gr.X-XX), of remarkable efficacy in preventing the ocular disturbances and diminishing the intensity of the headaches in certain cases.

Goubert (Sajous Vol.II., 1890 1.45) gives bromide of gold Gr.1/20 twice a day as a prophylactic. Gowers, in these cases in which there is conspicuous pallor during an attack, gives nitro-glycerine in the intervals. It should be begun with a small dose, e.g.  $\frac{1}{150}$  of a grain, and given twice or thrice daily after food. He believes the best way is to combine the 1% alcoholic solution with tincture of nux vomica, tincture of gelsemium and dilute phosphoric acid.

If there is dyspepsia, it may be given with dilute hydrochloric acid and some preparation of pepsine.

(2). Treatment of the Attacks.

We now come to the treatment of the attacks themselves - a point on which much praise may be gained if success attend the practitioner's efforts.

At the onset of the attack, various measures may be adopted. Most patients find that "rest in bed" in a darkened room is one of the best remedies. Experience has told them that sleep will often cure. Thomson (Journal of Mental Dis.) Feb. 1894) most strongly advocates rest. On the other hand some people, on the first inkling of the symptoms, go in for hard exercise, and I have at present a patient, a county magistrate, who vigorously polishes his various pairs of boots and finds that the exercise wards off the paroxysm. If, on the principle that the first shall be last, I give my own method of treatment, I append it on the ground that, though crude, it is to a certain extent original. Assuming that the cause must

be an irritant, and that irritant contained in the stomach or intestines, and that vomiting usually marks the close of the paroxysm, I have, in several cases, at once prescribed an emetic. I have used direct emetics, e.g., sulphate of zinc and copper: also, when these were not at hand, I have found salt and mustard of equal value. Where emesis could not be produced by these, I have, in one case, used the stomach tube. I have never injected apomorphine, on account of its depressing effect, but I have often thought that if it were combined with strychnine or digitalis, this effect might be avoided. I give next a 5 grain calomel purge in order to thoroughly clear out the intestinal tract. The patient is fed entirely on whey (made by boiling a pint of milk with two tablespoonfuls of lemon juice and straining) and an acid, such as the dilute nitro-hydrochloric, or dilute hydrochloric, combined with a bitter, is given for the next two or three days.

If the idea that migraine is due to an irritant poison be correct, and if, as Haig states, that poison is uric acid, it seems to me that in my simple



method of treatment I have unconsciously struck upon what may be the right one. At all events "experientia docet", and in the cases I have so treated, few comparatively though they be, I have met with signal success.

As I before remarked, it is only lately that I have read Haig's book and the results shown there, treated as they are on a wider scale and with full comprehension of the subject, so exactly coincided with what I had been striving after that I may be pardoned if I give them undue prominence.

I shall have somewhat further to say about Haig's ideas, but I must pass on meantime to other modes of treatment.

Burney Yeo states that he has found bromides of great service, and the combination of bromide with butyl-chloral hydrate of particular service in the case of neurotic subjects. Antipyrin and phenacetin are also of use in the slighter attacks and tend to lessen the pain of the more severe ones. Phenacetin is best given in 3-10 grain doses, and antipyrin in 5-10 grain doses, always taking care that not more

than 20-25 grains of the latter be taken in one day.

Caffein, at the beginning of an attack in grain doses every half hour till 5 grains are taken, certainly lessens the suffering.

Latham (Quain's Dictionary of Medicine), in the <sup>s</sup>stage of disturbed sensation says that directly the glimmering light appears the patient should lie down with his head low, and that he should lie on the opposite side from that on which the visual disturbance first appears.

An alcoholic stimulant should be administered, or, if this be objected to, sal volatile - one teaspoonful in water. If the patient be chilly, his couch should be drawn near the fire, and a hot bottle applied to his feet. After the glimmering has disappeared, he should lie still for a while, so that it may not return. If, instead of visual disturbance, there be a feeling of depression, irritability or fidgets, a cerebro-spinal stimulant e.g. henbane, valerian, spirit of chloroform, assafoetida, or ether, will often soothe the nervous irritability in the slighter forms, and it may be repeated, if

necessary, in 3-4 hours.

During the stage of headache and retching, he advises an attempt to check the latter. This he does by giving one or two drops of dilute hydrocyanic acid or spirit of chloroform, cold tea, or the effervescent citrate of potassium with dilute hydrocyanic acid.

Evaporating lotions applied to the head and a stimulating hot foot-bath to the feet. If the headache is severe, he gives bromide of potassium, gr 20  $\bar{c}$  tinct hyoscam M 20, and repeats if necessary in 2-3 hours.

In gouty cases, he gives chloride of ammonium gr. 15  $\bar{c}$  sp. chloroform and tinct. lavandulae. Guarana in 15 gr. doses has been tried. Sinkler recommends 10 grains of guarana with 5 grains of sodium salicylate, every 10-15 minutes, till three or four doses have been given.

Ramsay treated 50 cases exclusively by the correction of eye strain.

Lewis reports a series of cases in which oil of eucalyptus 5 minim doses every four hours gave

relief, and states that Weir Mitchell and Sinkler have employed the drug with benefit.

Many other drugs have been advised, e.g. hypodermic injections of hyoscamin gr.  $\frac{1}{50}$ , fluid extract of ergot every hour until 3 doses have been taken; aconitine gr  $\frac{1}{200}$ . every hour.

A hypodermic injection of morphia often acts no better than other sedatives, but occasionally it gives great relief.

Migraine has been much vaunted, especially by Ewald. I have the Berlin Klin. Wochenschrift, No 21., p.506., 1894, by me, but the extract is too long for repetition. He states "das migrain ist Bekänntlich ein Gemisch aus Antipyrin, Caffein und Citronsäure, welches im Gramme 0.09 Coffein pur, und 0.85 Antipyrin enthält."

Many local applications have been tried, e.g. liniments of belladonna, aconite, or simple counter-irritation by a mustard plaster to the nape of the neck. Solid menthol may sometimes alleviate the pain.

Electricity is not often of much use. Faradism rarely does any good. The voltaic current

passed through the head gives transient, but rarely permanent relief. In Germany, repeated galvanization of the sympathetic has been much recommended, one pole pressed deeply in front of the sterno-mastoid, the other held in the hand, and it is advised that when the symptoms of vaso-motor spasm predominate, the positive pole should be placed over the sympathetic and the negative when there is evidence of vaso-motor paralysis (Berger, Horst). This treatment is of doubtful value.

Neftel also advocates electricity. He says that in the case of plethoric individuals the galvanic current is the one to use, but in certain cases it is impossible to say whether the galvanic or faradic current should be employed, and in such cases, Neftel begins the treatment by the daily application of a moderate galvanic current, the negative pole on the nape of the neck, and the positive slowly moved over the forehead, eyes and face, with an occasional reversal of the current. If improvement does not occur in a week's time, the faradic current is used, the negative pole on the nape of the neck, the posit-

ive either on the epigastrium or moved about the anterior lower part of the neck, the force of the current being slowly increased and decreased.

I now come to Haig's treatment of this disease. It has succeeded so entirely in his own case that I cannot but be convinced that it is applicable to some of the forms which I have already mentioned.

His ideas are as follows:-. If uric acid is, under any conditions whatever, formed in excess, that is to say, in excess of the relation to urea of 1 of uric acid to 33 of urea, then it is our duty to prevent such excessive formation by any means in our power; but if, as he suggests, uric acid is never formed in excess of this relation, but accumulates in the body because some of the urate so formed fails to be excreted, while the more soluble urea is fully and completely excreted, then what we have to do is first of all to clear the body of the urate that has accumulated in it by means of solvents, such as salicylates, alkalies, phosphate of soda, etc., and

then to reduce the whole nitrogenous metabolism by reducing the income of nitrogen, so that the formation of uric acid with urea shall be permanently reduced; and, as the acidity falls with the urea, the solubility of the uric acid is but rarely interfered with, and there is but little likelihood that any of it will fail to be excreted and so be retained in the body. He fights uric acid by reducing the income of nitrogen, believing with Cullen "that gout seldom attacked people employed in constant bodily labour, and those who live upon vegetable diet."

His treatment is to reduce the nitrogen and run down the urea to three fifths or one half, or even less, of its original volume. In Pflüger's Archive (Vol XLI. p.533) he says that a healthy adult can maintain his weight and nitrogenous balance on 30-35 grammes of proteid = 5.8 grammes of nitrogen.

Prof. Humphrey (B.M.J., Vol.I., 1888 p.512) says that 62% of the aged take but little animal food, and I think this goes well with Cullen's views.

It is well, in certain cases, to be careful in too suddenly altering the diet for fear there may

be plus excretion of urate with its attendant symptoms of weakness, headache, depression, etc. In these cases it is well to begin with a course of solvents (preferably salicylates) to remove the urate accumulations.

So much for general principles. Let me now take up the treatment of the special indications. With regard to arterial tension, it is evident that the less urate there is in the blood, the lower it will be; that when there is little or no headache, in which the tension is very high, the tension, as a whole must be lower than when headaches are frequent and severe.

Marey's law is that pulse rate varies inversely as arterial tension, hence pulse rate is, to some extent, a guide to tension, e.g. if a person with temporary high tension has a pulse rate of 56 to 60, and the tension is pretty quickly reduced, the pulse will quicken to 68, 70, or more, but if the tension is permanently reduced to the same point, it will not keep up the rate of 70, and may fall to 56 or 60 with less tension and less urate than it did formerly,



when the general level of tension was higher. The treatment of more or less chronic high tension, when unassociated with inorganic disease, and due to functional uric acidæmia, is the clearing of the blood and body of all the urate they contain, and the reduction of formation for the future, by reducing the income of nitrogen. In regard to the immediate treatment of the high tension, this may be done by various ways. The most quickly acting of these are nitrites, but the effect is evanescent; if, however, they are followed by opium, acids, or mercury, a reduction of tension lasting for several hours is obtained. The dose of opium is M V-VIII of the tincture, or gr.  $\frac{1}{6}$  of any salt of morphine; acids e.g. dilute with hydrochloric, sulphuric, or phosphoric in doses of  $\mathfrak{z}\mathfrak{ss}$  in half pint of water, to be drunk in two hours, and after that M.V. three or four times a day. The dose of mercury is  $\mathfrak{ss}$  calomel twice or thrice a day, and if there is pain or diarrhoea with this, a little morphine may be combined with it.

Another mode of effecting tension is to give acids and salicylates, and this has the advantage

that it entirely clears the blood of urate, but, that this urate, instead of being retained in the body, as is the case when acids, opium or mercury are given, is removed from the body as salicyluric acid and excreted. The best method is to give M.X-XV. of a dilute acid well diluted in water, just before meals, and gr.XV-XX Salicylic acid after meals, three or four times a day.

In regard to headache, any of the drugs above mentioned will improve and cure the headache, because they relieve the blood of urate and reduce tension.

Salicylates should not be given when there is any nausea, as they will increase it, and so affect the digestive apparatus that all absorption will cease and their effect on the urate will be lost.

Haig treats an attack as follows:- if it is slight, he advises a small dose of opium or acid, absolute quiet and warmth to the feet. If the attack is advanced and severe, the feet must be put in hot water, and kept there for some time, and warm wraps and a chair close to the fire should be used.

Sitting vertically with the head turned up to the ceiling greatly reduces the pain and Haig thinks that in most cases the horizontal position makes it worse.

Food may be taken as usual, if there is no nausea, and a little sherry or champagne will do good, as it acts as an acid and tends to dilate the contracted vessels.

If the headache improve with these measures, all that is necessary ~~is~~<sup>is</sup> to keep quiet and warm for a few hours. If, however, it gets worse, it is almost certain to be due to serious disturbance of digestion, to which will presently be added nausea and vomiting. The best thing here is a small injection of morphine and other treatment of the stomach. For this latter hot water or hot tea is the best, with a mustard leaf on the epigastrium for twenty minutes: if these fail to remove the nausea, then empty the stomach by means of warm water as an emetic, and when this is done give Hunjedi János Water, or any aperient water containing sulphates.

In this way, the stomach and intestines are

cleared out and got ready for digestion, food can be begun again, and a little acid and nux vomica taken before it. The first question is how to prevent the attacks, and this must be done to a great extent by diet.

I quote Haig's dietary, which he asserts has reduced his urea from 500-600 grs in 24 hours on ordinary diet, to 300 grs on the following, and this with perfect immunity from uric-acidaemia and its unpleasant results.

#### Animal Food.

Milk 1-1½ pints (Previously boiled).

Egg, Fish, Fowl, or Game, 1-4 oz. varied a little from day to day.

#### Vegetable Food.

Vegetable prepared products. )

Vegetables twice a day. )

Fruit thrice a day. )

to any desired  
extent according  
to appetite.

Tea. }

Coffee. }

Cocoa. }

In moderation and as flavourings,  
rather than strong decoctions.

It will be found that where animal food is thus reduced, larger quantities of vegetables and fruit can be taken and can be better digested; and much the same can be said of butter, fat, & sugar. To sketch his diet in detail:--

#### Breakfast.

A large soup plate, half full of porridge and taken with milk or salt.; a few mouthfuls of fish or egg.; one or two rounds of bread or its equivalent in toast or scones with plenty.; of butter.; a cup of milk, flavoured with tea, coffee, or cocoa (previously boiled).

Finish with a small quantity of any fruit in season.

#### Lunch.

Potato and one or two vegetables, cooked in various ways, eaten with butter, fat, or various sauces.; Pudding, tart, or stewed fruit.

Biscuit and Butter. A little fruit as at breakfast.

For drink, a little milk, warmed in winter, in summer, a little fruit syrup with the milk, e.g. Stower's Lime Juice.

Afternoon Tea.

Bread & butter and cake. A little milk and water, flavoured with tea.

Dinner.

Soup made without meat or stock. Fish, a very small piece. Two vegetables, with sauces, butter or fat. Any ordinary pudding, tart, or stewed fruit, though not as a rule very rich dishes, containing many eggs.

Biscuit and butter.

A good supply of various fruits for dessert.

For drink, water with syrup, aerated waters, or a little milk, warmed in winter.

A tumbler of water, aerated water, or, in winter, hot water, at bed-time.

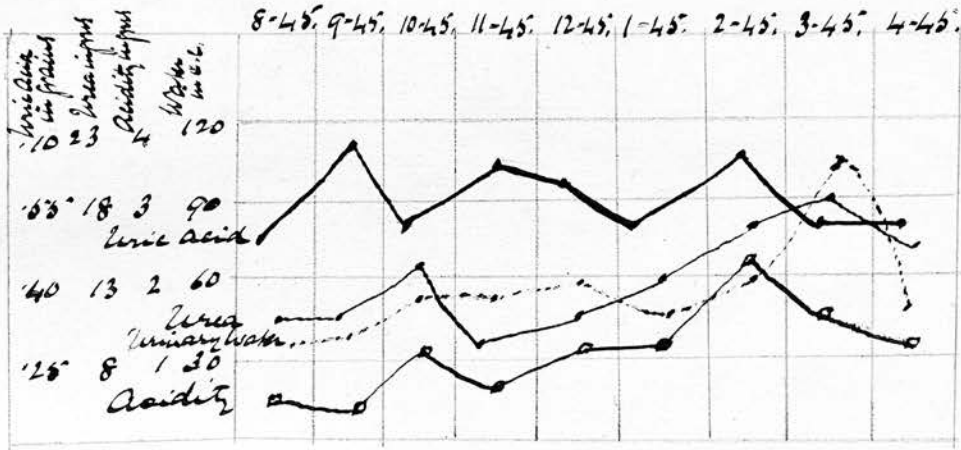
This diet he has found completely prevents any recurrence of the attacks. He has not lost weight, and is as fit for any exertion of mind or body on this diet as on any other.

In conclusion, I can only add that the subject teems with difficulties. Far be it from me to criticise the many views promulgated by as many authorities. The text-books are full of the various methods of treatment, and the general practitioner has, comparatively, little chance of experimenting with them all. His principle is (or ought to be) to cure his patient as soon as he can, and to do this with the means at his command. A reputation may easily be made by even the cure of migraine. In these pages I have endeavoured to do full justice to the authors from whom I have quoted. I have written what I have, with all the means at my command, and I submit this, my thesis, to the Senatus in the hope that they will not judge its shortcomings so hardly as I do.

*W. Herbert Gregory*

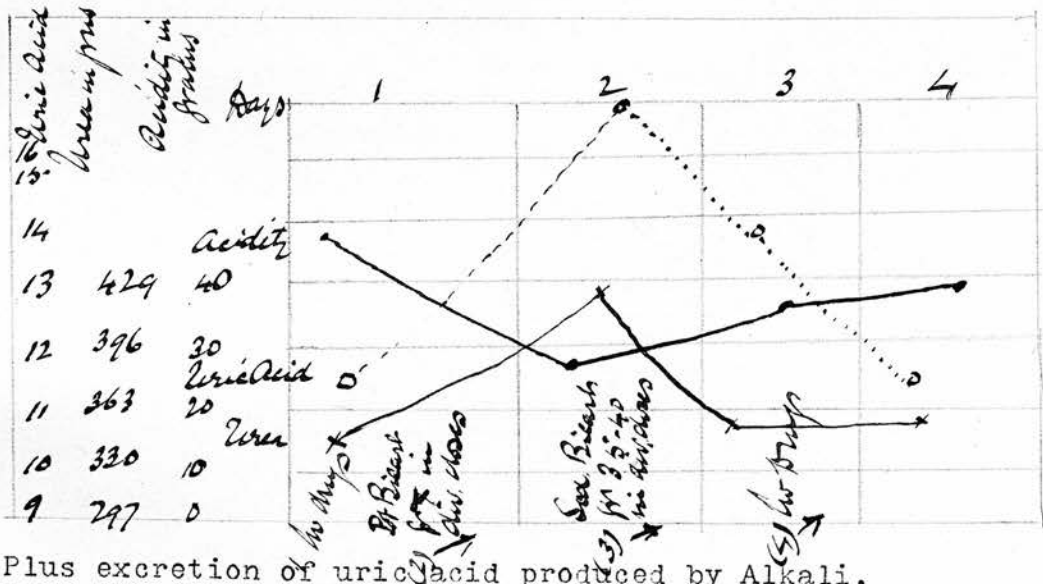
*Cover*

I append here several of Haig's tables on the effect of drugs on the excretion and retention of uric acid.

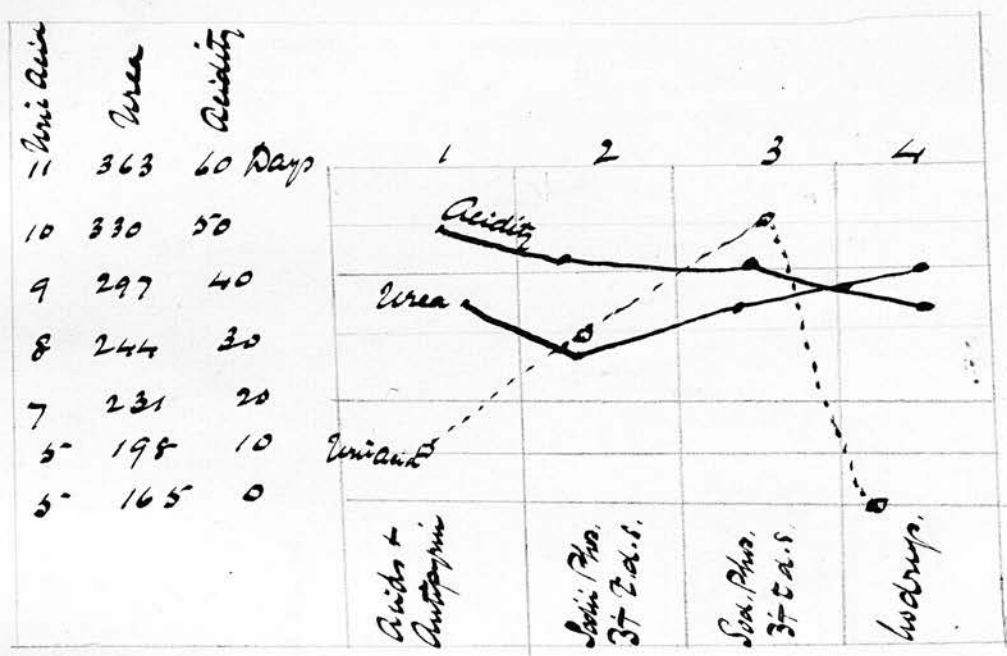


Nature, plus excretion of uric acid with Alkaline tide.

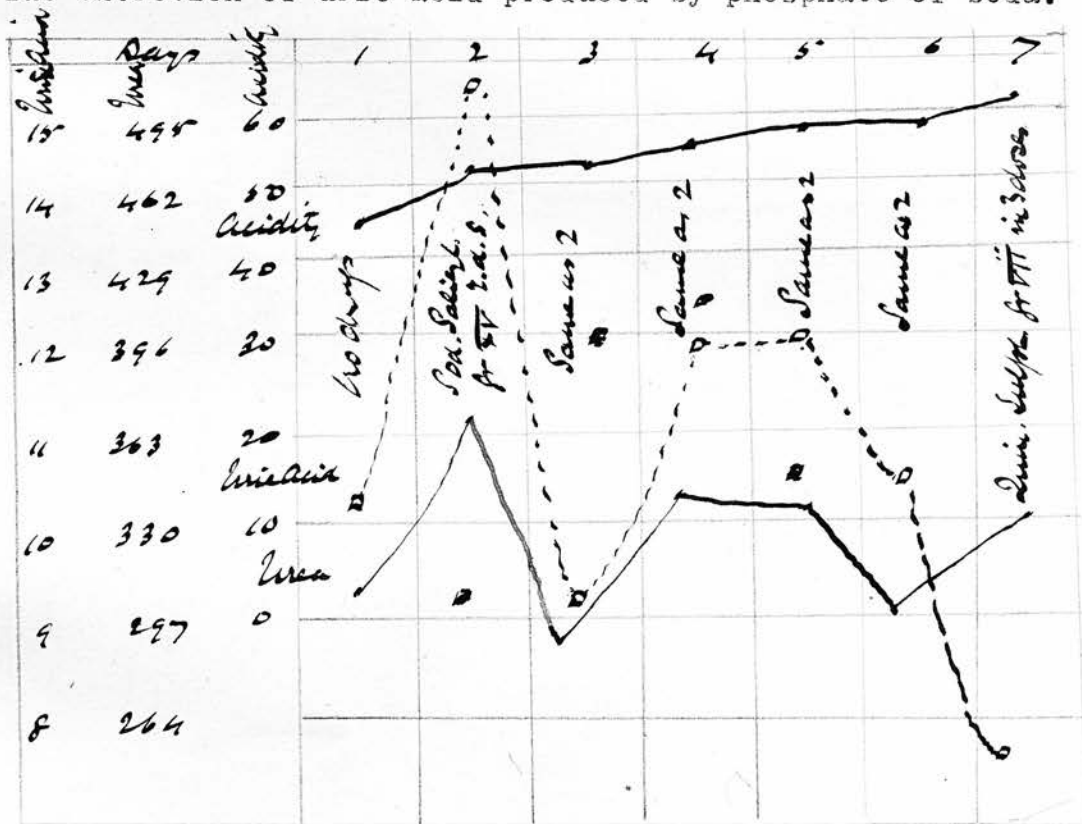
Breakfast ended 9.50 a.m. Lunch ended 2.10 p.m. Two and a half miles sharp walking 3-3.45 p.m. Perspiration and low tension pulse after walk. Total urinary water:- 527 cubic c.c. Total urea - 118 grs. Total uric acid - 5 grs. Relation of uric acid to urea 1 in 23.6.



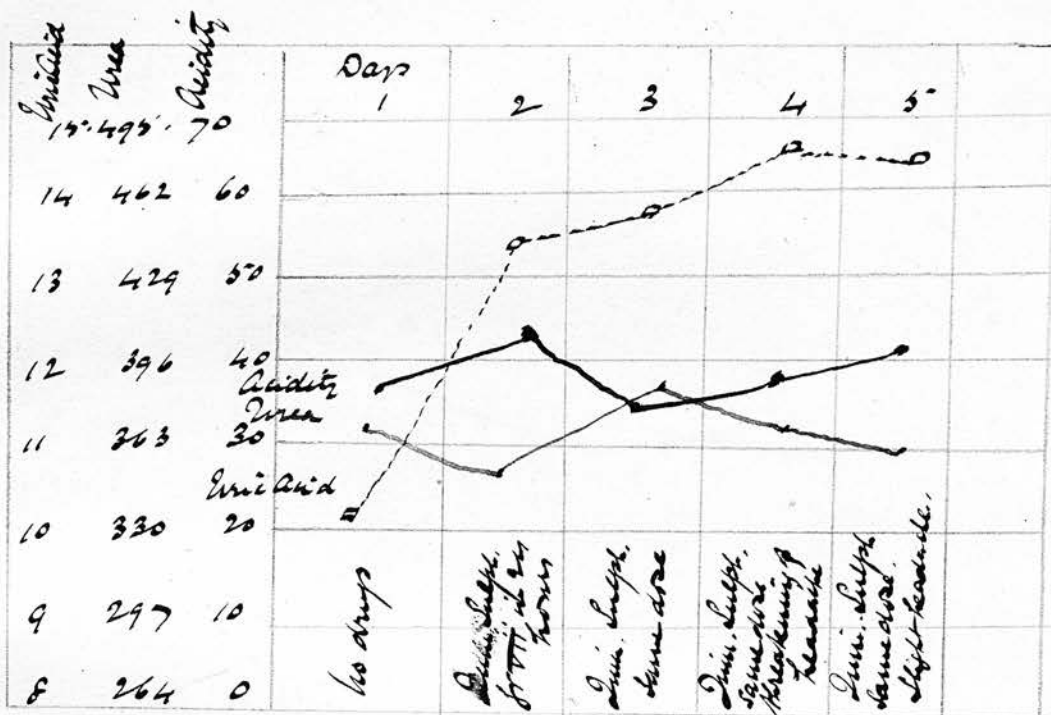




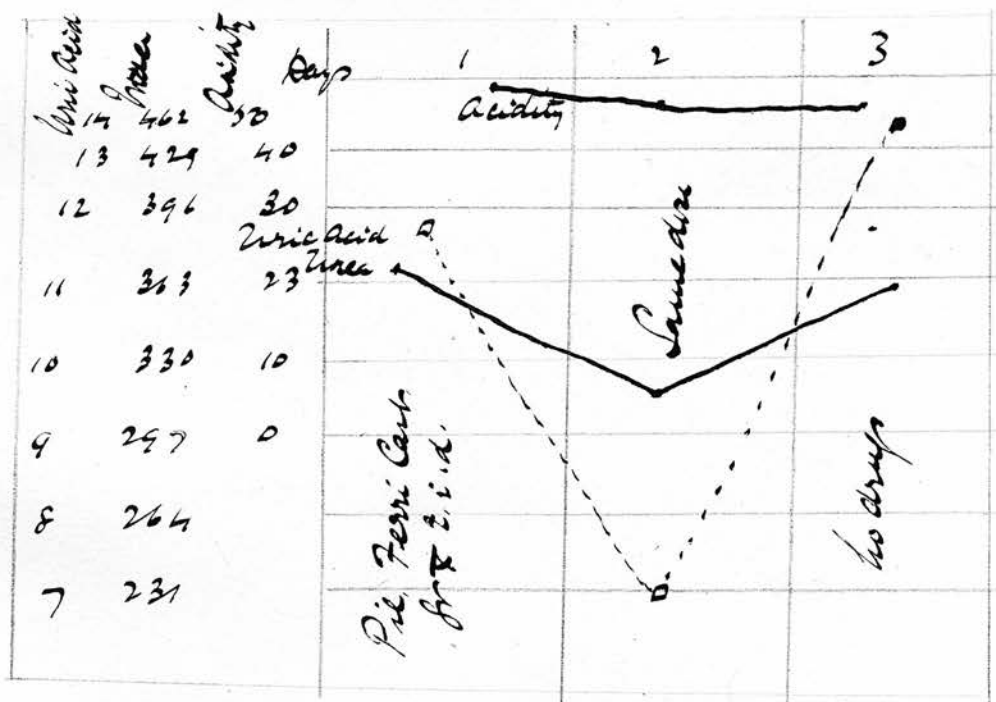
Plus excretion of uric acid produced by phosphate of soda.



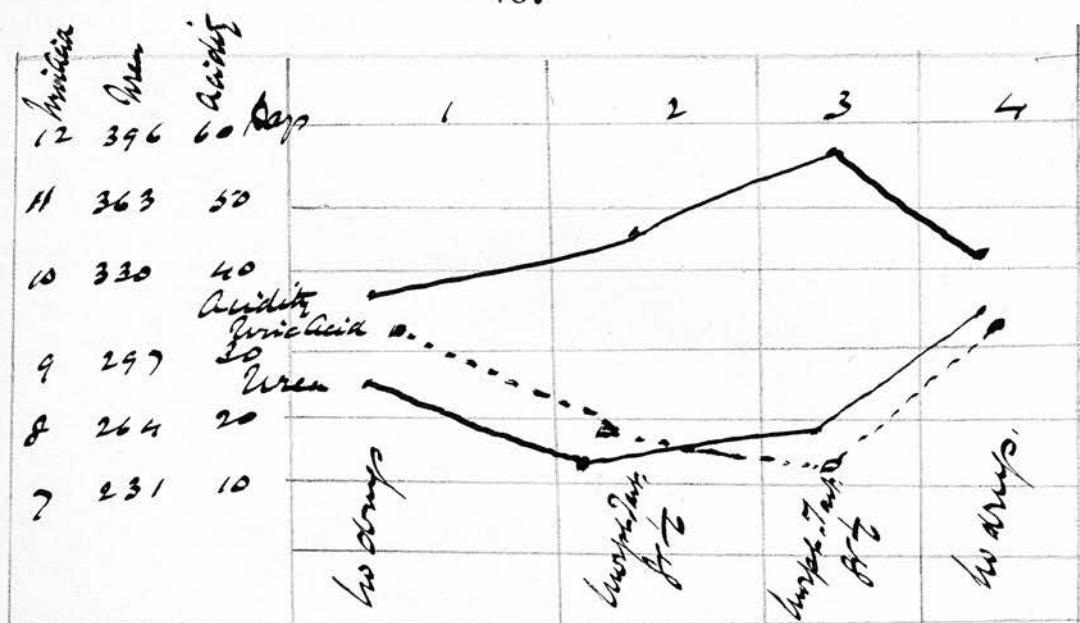
Plus excretion of uric acid produced by salicylate of soda.



Plus excretion of Urate produced by small doses of Sulphate of Quinine.

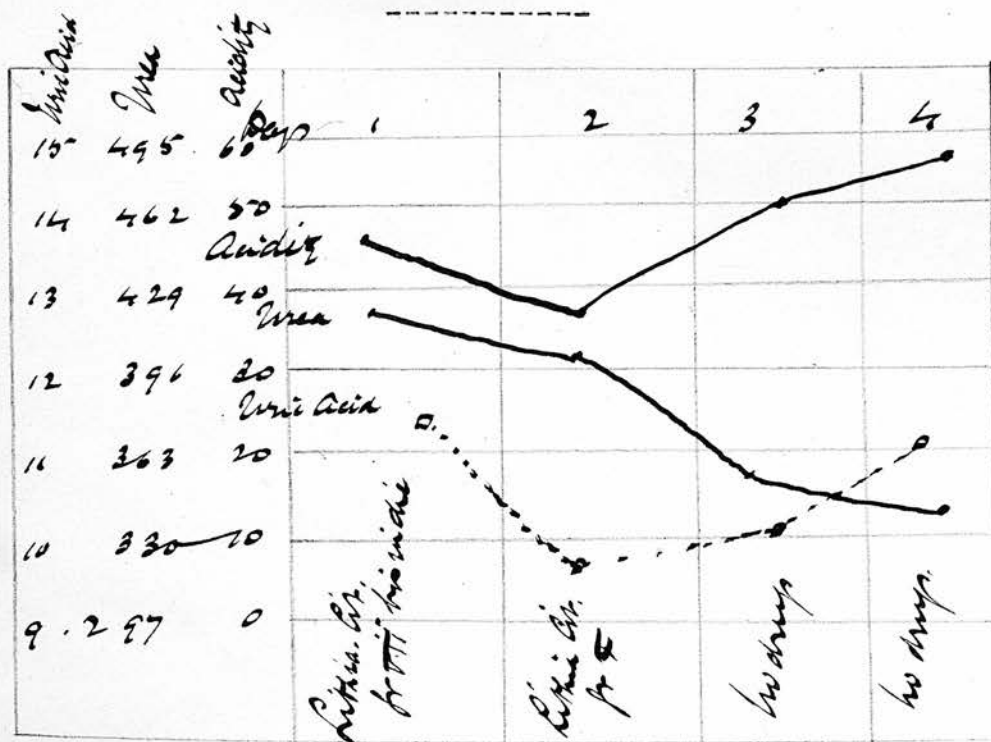


Retention of Uric Acid produced by Iron, from Med. Clin. Trans.



Rise of acidity and retention of urate produced by Morphine.

The dose of Morphine was taken at 11.p.m. on day 2. at 8.a.m. on day 3. It raised the acidity of both days, but affected the alkaline tide only on day 3.



Retention of Uric Acid produced by Lithia. From Med. Clin. Trans.